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## NOTES ON THE VARIATION OF STROMBUS PUGILIS.

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A large series of *Strombus pugilis* Linné, with its varieties *alatus* Gmel. and *nicaraguensis* Fluck, together with its Pacific analogue, *S. gracilior* Sowb., and their Oligocene precursors, *S. proximus* Sowb. and *S. pugiloides* Guppy, form a very interesting group for studying the evolution and variation of a species.

Young specimens (lacking the body whorl) differ even more in general appearance than the adults. The apices of most specimens are usually wanting, but a young example of the typical form and one of the variety *alatus*, in the collection of the Boston Society of Natural History, show the following differences: In *pugilis* the *first* two whorls are entirely smooth; the *third* with obsolete longitudinal ribs; the *fourth*, *fifth* and *sixth* with prominent ribs and two or three varices to each whorl, but without spiral lines; *seventh* with ribs, spirals and varices; *eighth* nodulose, with a varix and prominent spirals; *ninth* nodulose, with prominent spirals; *tenth* with coarse spirals and fine intermediate lines; the row of nodules are almost covered by the following whorl; the *eleventh* (preceding the body whorl) has long spines at the periphery, a few spirals below the suture and at the anterior half, the remainder of the whorl being smooth; length of specimen 42 mm.

In the specimen of *alatus* the protoconch is broken, but a part of the third whorl would indicate two smooth whorls, as in *pugilis*; the

*fourth* whorl has some obsolete longitudinal ribs and spiral lines at the base; the *fifth*, *sixth* and *seventh* have prominent longitudinal ribs and spirals, without varices; *eighth* with similar sculpture and one varix; on the *ninth* the ribs and spirals form slight nodules at the shoulder, with one varix; *tenth* subnodose with coarse spirals; *eleventh* subnodose with coarse spiral ridges and fine intermediate lines covering the entire whorl. Length 49 mm.

Though larger, it is apparently the same age as the specimen of the typical form. Whether the above characters will prove to be constant I cannot say. The typical form seems to assume the larger spines of the adult one whorl in advance of the variety *alatus*. The variety *nicaraguensis* is smaller than either *pugilis* or *alatus*, and the spiral ridges usually cover the entire body whorl of the adult shells. *S. gracilior* loses its spirals much earlier than *S. pugilis*.

In the adults there are some marked variations both in color and form. The typical *pugilis* is less variable in color, ranging from an orange-yellow to carnelian-red; *alatus* varies from white to purple, and from a purplish brown to deep orange or carnelian-red. Externally *pugilis* is usually a uniform yellowish brown, while *alatus* varies from a light yellow to a dark brown, the latter color often disposed in bands or zigzag markings; *nicaraguensis* is of a uniform dark salmon color.

The length and shape of the spines vary in both forms. A figure in Chemnitz (Conch. Cabinet, X, tab. 196, f. 1493), shows the rows of spines at the periphery; the two united would give the broad, vertically compressed spines as figured by Chenu (Manuel Conch., I, p. 225, fig. 1582). In the many specimens which I have examined I have never seen these forms; they probably represent unique abnormal specimens. Tryon is wrong in making the *non-spinose* form of *alatus* typical. The figure referred to by Gmelin (Conch. Cabinet, III, tab. 91, f. 894) is the common brown form of Florida, with a row of subacute tubercles on the body whorl. Lamarck, under *S. pyrulatus*, refers to the same figure. Specimens of *alatus*, in which the tuberculate spines are entirely wanting, are not common, only about five or ten per cent. I found the greatest number at Marco, Florida. A spineless form of *pugilis* has also been recorded. A specimen in the Boston Society's collection has the spines wanting in the greater portion of the body whorl, as figured by Knorr, III, tab. 16, fig. 1.